

A COMPARATIVE STUDY OF SECONDARY CLOSURE OF POST-OPERATIVE WOUND DEHISCENCE BY SUTURING VERSUS APPPOSITION WITH ADHESIVE TAPES

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ABSTRACT

A prospective interventional comparative study was conducted in the Department of General Surgery, Medical College and Hospitals, Kolkata to compare the effectiveness of wound healing in suturing and apposition with adhesive tapes.

The study comprised of 40 cases, admitted in the various surgical units of Medical College and Hospital, Kolkata.

Overall, secondary wound closure lead to increased painless cosmetic acceptability and a slightly higher incidence of wound infection post-procedure as compared to secondary suturing, whereas secondary suturing had a shorter wound re-epithelialization time

KEYWORDS: Secondary closure; Post operative wound dehiscence; Suturing; Adhesive tapes

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INTRODUCTION

Post-operative wound dehiscence is a known complication of surgical wounds. Most of the time after a short period of preparation, the dehiscent wound is treated by traditional method of closure by mattress sutures with monofilament polyamide. The procedure of suture closure has certain demerits; so an alternative procedure was looked for to close the wound without taking the patient to Operation Theatre for secondary suture. Apposition of the wound margins with adhesive tapes may be considered as an alternative option. It is a painless procedure requiring no anesthesia.

MATERIALS AND METHODS

This prospective interventional comparative study was conducted from the month of January 2017 to June 2020 in the Department of General Surgery, Medical College and Hospitals, Kolkata. The study comprised of 40 cases, admitted in the various surgical units of Medical College and Hospital, Kolkata.

The type of sampling was random. During this period cases admitted in various surgical units for abdominal surgery and developed complication of wound dehiscence were selected at random. Post-operative wound dehiscence as a complication of any abdominal surgical procedures in both emergency and elective cases will be included.

Exclusion criteria

- Non-surgical traumatic wounds were not included.
- Wounds extending beyond the skin and subcutaneous tissue deep were not considered for adhesive tape closure

Materials required:-

A-For Secondary Suturing

- Monofilament polyamide suture(2-0/3-0) with reverse cutting needle
- Needle Holder
- Toothed dissecting forceps Scissors

B-For Apposition with Adhesive Tapes

- Multiple wash proof adhesive surgical strips
- Sterile gauzes
- Micropore adhesive dressing tapes

Appendicectomy Wound 18 Days after Apposition with Adhesive Tapes**Photos Showing Cross-Hatchings from Secondary Suturing**

RESULTS AND ANALYSIS

Table 1: Distribution of Procedure used

Procedure used	Frequency	Percent
Secondary Suturing	18	45.0%
Apposition with Adhesive Tapes	22	55.0%
Total	40	100.0%

Table 2: Distribution of mean Pain according to visual analog scale vs Procedure used

	Number	Mean	SD	Minimum	Maximum	Median	p-value
Secondary Suturing	18	5.7222	.8264	4.0000	7.0000	6.0000	<0.0001
Apposition with Adhesive Tapes	22	3.3182	1.0861	2.0000	6.0000	3.0000	

Difference of mean pain according to visual analogue scale in two procedure was statistically significant ($p < 0.0001$).

Table 3: Association between Pain_according_to_visual_analog_scale vs Procedure used

PROCEDURE USED			
Pain(according to visual analog scale)	Secondary Suturing	Apposition with Adhesive Tapes	TOTAL
2	0	5	5
Row %	0.0	100.0	100.0
Col %	0.0	22.7	12.5
3	0	9	9
Row %	0.0	100.0	100.0
Col %	0.0	40.9	22.5
4	2	5	7
Row %	28.6	71.4	100.0
Col %	11.1	22.7	17.5
5	3	2	5
Row %	60.0	40.0	100.0
Col %	16.7	9.1	12.5
6	11	1	12
Row %	91.7	8.3	100.0
Col %	61.1	4.5	30.0
7	2	0	2
Row %	100.0	0.0	100.0
Col %	11.1	0.0	5.0
TOTAL	18	22	40
Row %	45.0	55.0	100.0
Col %	100.0	100.0	100.0

Chi-square value: 25.6758; p-value: 0.0001

Association of pain according to visual analogue scale in two procedure was statistically significant ($p=0.0001$)

Table 4: Association between Keloid vs Procedure used

PROCEDURE USED			
Keloid	Secondary Suturing	Apposition with Adhesive Tapes	TOTAL
No	14	20	34
Row %	41.2	58.8	100.0
Col %	77.8	90.9	85.0
Yes	4	2	6
Row %	66.7	33.3	100.0
Col %	22.2	9.1	15.0
TOTAL	18	22	40
Row %	45.0	55.0	100.0
Col %	100.0	100.0	100.0

Chi-square value: 1.3389; p-value: 0.2472

Association of Keloid in two procedure was not statistically significant ($p=0.2472$).

Table 5: Association between Cross Hatching vs Procedure use

PROCEDURE USED			
Cross Hatching	Secondary Suturing	Apposition with Adhesive Tapes	TOTAL
No	3	22	25
Row %	12.0	88.0	100.0
Col %	16.7	100.0	62.5
Yes	15	0	15
Row %	100.0	0.0	100.0
Col %	83.3	0.0	37.5
TOTAL	18	22	40
Row %	45.0	55.0	100.0
Col %	100.0	100.0	100.0

Chisquare value: 29.3333; p-value <0.00001

Association of Cross Hatching in two procedure was statistically significant ($p<0.00001$).

Table 6: Distribution of mean Time required for re-epithelialisation of wound vs Procedure

	Number	Mean	SD	Minimum	Maximum	Median	p-value
Secondary Suturing	18	15.3889	2.9929	12.0000	21.0000	14.0000	0.0003
Apposition with Adhesive Tapes	22	19.0455	2.7685	14.0000	25.0000	20.0000	

Difference of mean Time required for re-epithelialisation of wound in two procedure was statistically significant ($p=0.0003$).

Table 7: Association between Incidences of infection vs Procedure used

PROCEDURE USED			
Incidence of infection (as evidenced by discharge of pus)	Secondary suturing	Apposition with Adhesive Tapes	TOTAL
No	13	21	34
Row %	38.2	61.8	100.0
Col %	72.2	95.5	85.0
Yes	5	1	6
Row %	83.3	16.7	100.0
Col %	27.8	4.5	15.0
TOTAL	18	22	40
Row %	45.0	55.0	100.0
Col %	100.0	100.0	100.0

Chi-square value: 4.1909; p-value: 0.04064

Association of Incidence of infection in two procedure was statistically significant (p=0.04064).

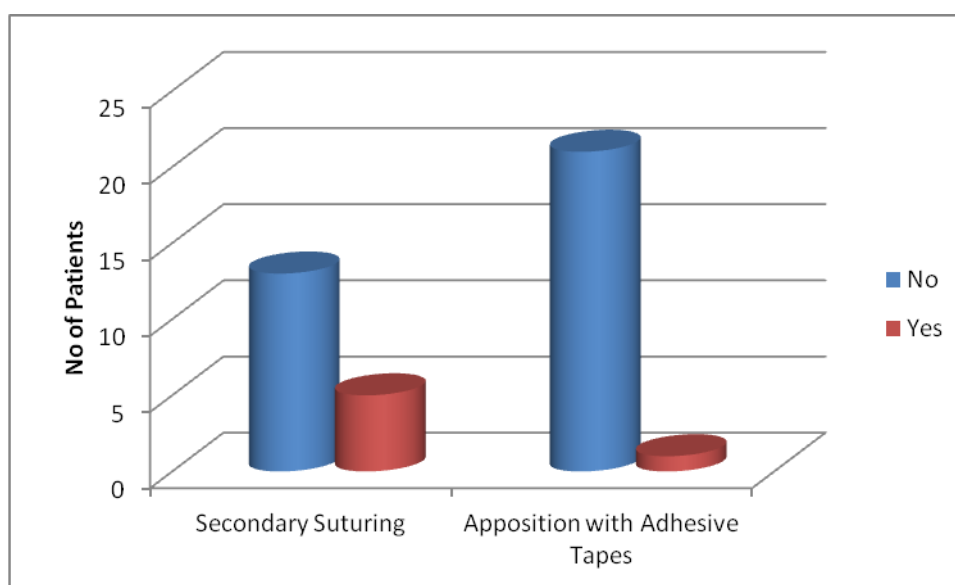
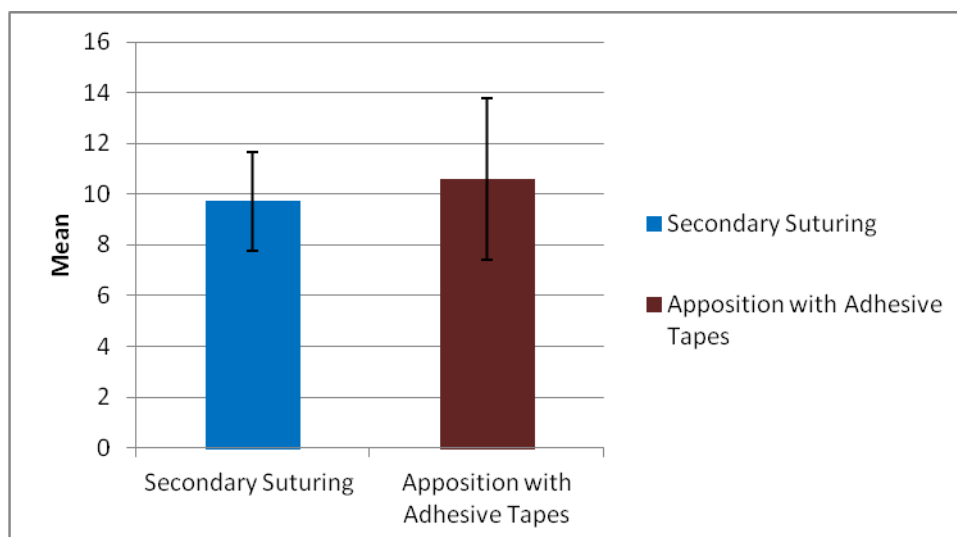


Table 8: Distribution of mean Time taken for discharge of patient from hospital vs Procedure

	Number	Mean	SD	Minimum	Maximum	Median	p-value
Secondary Suturing	18	9.7222	1.9344	7.0000	15.0000	10.0000	0.3160
Apposition with Adhesive Tapes	22	10.5909	3.1722	7.0000	15.0000	9.5000	

Difference of mean Time taken for discharge of patient from hospital in two procedure was not statistically significant (p=0.3160).



DISCUSSION

Although, much work has been done comparing primary wound closure with sutures and adhesive tapes, studies comparing secondary wound closure with sutures and adhesive tapes are scarce. In 2003, Colt JD conducted a study comparing adhesive surgical tape with absorbable continuous subcutaneous suture. The study found that tape closure not only had the benefits of lower wound infection rates and higher wound tensile strength, but also the time required for epidermal reactivity, skin edge inversion, skeptical care and careful surgical technique. [1]

Custist.T et al. Published a study on the effect of adhesive bandages and skin strips vs. dermal sutures only on wound closure. When assessed by blind observers or patients themselves, the formulas combined with adhesive bandages and buried interrupted subcutaneous formulas are no better than the buried subcutaneous formulas.[2]

In 2009, Hochberg et al published in Surgical Clinics in North America that modern dermal tape plays an important role in wound closure and has some advantages over stitches and staples. Closing with microporous tape creates greater resistance to infection than other sealing methods[3]

The tapes maintain the integrity of the epidermis, resulting in less pressure on the wound. Linear lesions in areas with low tension can be easily assessed with tape alone, while lesions are present in areas where the skin is more tight. [4]

Twelve RCTs were included to study 1317 incisions in 1023 patients. No difference was found with respect to infection development (odds ratio [OR] = 0.47; 95% confidence interval [CI] = 0.12–1.85), attenuation (OR = 1.22; 95% CI = 0.32–4.64), and overall aesthetic outcome (standard Average difference = 0.01; 95% CI = -0.19 to 0.20). Closing with strips significantly reduced redness (OR = 0.57; 95% CI = 0.37–0.89). Synthesis of available data on pain, resuscitation, inflammation, patient satisfaction, and time of discontinuation with use of strips is not possible; However, with regard to the subsequent results, the application of the strips seemed to be favorable. There is considerable variation in studies.[5]

To this day, there is no understanding of how relatively wound closure techniques work in the daily bodily movement during healing and how they affect the mechanics of healing. The present study is the first step in understanding the difference and calculating it objectively. Levy K et al conducted a study that provided a new metrology method for the non-invasive assessment of skin mechanics at the beginning of wound healing and the emerging tape-based wound closure

technique. The latter shows excellent performance with respect to commonly used staples and stitches, providing wound retention and uniform mechanical support throughout the incision.[6]

There are many factors involved in the selection of skin wrapping materials, including the type and location of the wound, the material available, the physician's expertise and preferences, the patient's age and health. The best use of different skin closure materials provides surgeons to select the appropriate material for different wounds according to the best evidence available.[7]

Experimental studies have been reported that provide a rationale for the use of tape to close contaminated wounds. These studies suggest that taped wounds are more resistant to infection than suture wounds. Rodeheaver, George et al suggested that the principles of subcutaneous and subcutaneous may potentiate the development of infection. The new tape is specially designed for wound closure. This is non-woven reinforced microporous tape. Its microscopic structure allows air and water vapor to pass through and limit the growth of skin bacteria. To prevent breakage, reinforcing rayon filaments were installed in its backing. A "tackifier" was added to the adhesive to secure the tape to the skin. The development of this new surgical tape contributes greatly to wound closure without stitches.[8]

The concept of using surface adhesive tape to seal surgical wounds refers to the development of satisfactory suture techniques. But previously available wound adhesive tapes do not have enough adhesive properties and result in skin irritation or scarring. Wound adhesive tapes are an effective alternative to suture closure. [9]

For this study suture closure appears to be a good technique for the secondary closure of the wound decompression based on the initial result of the healing time. Therefore, suture closure appears to be the best option for secondary closure of the surface wound amputation. However, both suture and surgical tape have historically been more effective treatments than the second intent.[10]

CONCLUSIONS

In conclusion, this comparative, interventional & longitudinal study between secondary wound closure with mattress sutures and secondary wound closure by apposition with adhesive tapes yielded the following results-

- There is a statistically significant difference between pain experienced by the patients in the two sets of the procedure used, with patients in the set of wound closure by apposition with adhesive tapes experiencing consistently less pain than patients undergoing secondary suturing.
- There is a statistically significant difference between amount of scarring that occurred in the two sets, with patients undergoing secondary suturing having ugly "cross-hatchings" over the wound. At the same time There is no statistically significant difference between keloid/hypertrophic scar formation in both the groups.
- There is a statistically significant difference between incidence of infection experienced in the two procedure sets, with patients undergoing secondary suturing having higher infection rates.
- There was a statistically significant difference between the time taken for wound re-epithelialisation, with patients undergoing wound closure by apposition with adhesive tapes having longer wound re-epithelialisation times.

- There was no statistically significant difference between time required for discharge of the patients in two procedure sets, with patients in both sets having similar time required for discharge.
- Thus the method of secondary wound closure for superficial wound dehiscence by apposition with adhesive tapes was proved superior to secondary suturing in terms of pain experienced, infection rates, and scarring in this study. In terms of time required for discharge from the hospital, both the procedures were similar in this study. So, it can be said that secondary wound closure by apposition with adhesive tapes is a safe, effective and alternative method.

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